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METHOD OF TEST FOR EVALUATING PAINTED METAL TARGET PLATE MATERIAL

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Part 10 of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

This test method describes the procedures for evaluating white painted metal used for guide markers, milepost markers, underdrain markers, conduit markers, cattle pass markers, clearance markers, and horizontal reflector markers. This test method is divided into the following parts:

1. Method of Determining Dry Film Thickness
2. Method of Determining Coating Hardness
3. Method of Determining Impact Resistance
4. Method of Evaluating Coating Adherence
5. Method of Evaluating Salt Spray Resistance
6. Method of Evaluating Chemical Resistance
7. Method of Evaluating Weatherability by Artificial Accelerated Weathering
8. Method of Determining Specular Gloss
9. Method of Determining Chromaticity
10. Safety and Health

PART I. METHOD OF DETERMINING DRY FILM THICKNESS

A. SCOPE

This method describes one of several acceptable ways of determining the dry film thickness of paint on an aluminum substrate.

B. TEST PROCEDURE

Use the apparatus and the procedures as specified in ASTM Designation: D 1400, Method C. To measure the primer thickness of a two-coat system, remove the top coat with acetone and proceed as described above.

C. REPORTING

Report the measured dry film thickness to the nearest 0.001 mm.

D. PRECAUTIONS

ASTM Designation: D 1400 covers only measurements of dry film thickness on nonmagnetic metals. Currently, all painted metal target plates purchased by Caltrans are aluminum.

E. NOTES

Methods other than ASTM Designation: D 1400, of equivalent or greater accuracy, may be used. In case of a dispute, photomicrography may be used.

PART 2. METHOD OF DETERMINING COATING HARDNESS

A. SCOPE

This method describes the procedure for determining the relative hardness of a paint coating.

B. APPARATUS

1. Pencils with lead hardness of B, HB, F, H, 2H, and 3H shall be used (this listing, from left to right, is in order of increasing hardness.)

2. Fine grit sandpaper or emery cloth is required.

C. TEST PROCEDURE

Strip wood from pencil leaving the full lead diameter. Using fine grit sandpaper or emery cloth, flatten end of lead so it is 90° to the pencil axis. Hold pencil at 45° to coated surface and push forward about 6 mm, using as much downward pressure as can be applied without breaking the lead. If the lead ruptures the film, repeat procedure, using next softer grade lead. The pencil lead hardness of the film is the hardness of the first (hardest) lead which will not rupture the coating.

D. REPORTING

Report the pencil lead hardness of the paint film.

PART 3. METHOD OF DETERMINING IMPACT RESISTANCE

A. SCOPE

This method describes a procedure for determining the ability of a coating to withstand a severe impact without affecting its ability to protect the metal substrate.

B. APPARATUS

1. A variable impact testing machine shall conform to the requirements in ASTM Designation: D 3029, Method G, Geometry GC.

2. 3M Co. Scotch brand cellophane tape No. 600, 19-mm wide (age of tape not to exceed 6 months) is acceptable.

C. TEST PROCEDURE

Subject both sides of the sample, at 23 ± -2°C, to an impact force sufficient to rupture the coating. Firmly apply cellophane tape to both surfaces of the deformed area and pull off "sharply".

D. REPORTING

Report the appearance of the specimen. There should be no coating loss and no loss of adhesion between the top coat/primer interface or the primer/substrate interface of the two-coat system or between the coating/substrate interface on the one-coat system.

PART 4. METHOD OF EVALUATING COATING ADHESION

A. SCOPE

This test method describes a procedure for determining whether effective paint adhesion has been provided by the process used to prepare the metal for painting.

B. TEST PROCEDURE

Test materials in accordance with California Test 645.

C. REPORTING

Report results as discussed in California Test 645.

PART 5. METHOD OF EVALUATING SALT SPRAY RESISTANCE

A. SCOPE

This method describes a procedure for evaluating the ability of a paint system to protect the metal substrate from the effects of a marine or other corrosive environment.

B. TEST PROCEDURE

Use the apparatus and procedures as specified in ASTM Designation: B 117. Expose a 100 by 200-mm specimen of coated metal which has been prepared and painted in the same manner as the lot of material which is represented by the sample for the following: 1,000 h for material to be used within 1.6 km of the seacoast or otherwise may be subjected to a marine environment; or 300 h for material to be used in other areas.

C. REPORTING

Report the appearance of the specimen. Undercutting of the film should not exceed 1.5 mm from a line scored diagonally, deep enough to expose base metal and edges; or along any exposed edges.

PART 6. METHOD OF EVALUATING CHEMICAL RESISTANCE

A. SCOPE

This method describes a procedure for evaluating the ability of a paint system to resist damage by common cleaning chemicals.

B. APPARATUS AND MATERIALS

1. A container capable of accommodate 100 by 200-mm specimens.

2. Mineral spirits

3. A detergent solution, 0.5% by volume, (such as Tide or equivalent)

4. Trisodium phosphate solution, 2% by volume.

5. Soap solution, 2% by volume (such as Ivory or equivalent)

C. TEST PROCEDURE

Cut four 100 by 200-mm specimens from a sample which has been prepared and painted in the same manner as the lot material which is represented by the sample. Totally immerse one specimen each for 24 h in the four chemical solutions. Remove, rinse in clear water, and allow 24-h recovery prior to evaluation.

D. REPORTING

Report the appearance of the specimens. There should be no loss of adherence or gloss, no color change or staining.

PART 7. METHOD OF EVALUATING WEATHERABILITY BY ARTIFICAL ACCELERATED WEATHERING

A. SCOPE

This method describes a procedure for evaluating the resistance of a paint system to degradation by ultraviolet radiation.

B. TEST PROCEDURE

Test in accordance with ASTM Designation: G 26, Type B or BH Xenon Arc Weather-Ometer using Method A, a cycle of 102 min of light followed by 18 min of light and water spray.

C. REPORTING

Report the appearance after 1000 h of exposure. The coating weight loss should not be greater than 0.0015 mg/mm^2. There should be no loss of adhesion. Slight chalking and

color change may be satisfactory. Normal water spotting shall not be cause for rejection.

PART 8. METHOD OF DETERMINING SPECULAR GLOSS

A. SCOPE

This method describes a procedure for determining the surface specular gloss of nonmetallic materials.

B. TEST METHOD

Use the apparatus and procedures specified in ASTM Designation: D 523.

C. REPORTING

Report the gloss reading at 60˚ geometry.

PART 9. METHOD OF DETERMINING CHROMATICITY

A. SCOPE

This method describes a procedure for the instrumental determination of the color of the coated target plate.

B. TEST METHOD

Test in accordance with California Test 660 or use the procedures and apparatus described in ASTM Designation: E 1164 or E 1347. The measurement geometry shall be Normal/45° or 45°/Normal.

C. REPORTING

Plot the x and y chromaticity coordinates on a chromaticity chart compiled according to the 1931 CIE Standard Observer Coordinate System. The percent purity is read directly from the chart. Record the daylight luminous directional reflectance ("Y" value) reading on the chart.

Part 10. SAFETY AND HEALTH

Prior to handling, testing or disposing of any waste materials, testers are required to read: Part A (Section 5.0), Part B (Sections: 5.0, 6.0 and 10.0) and Part C (Section 1.0) of Caltrans Laboratory Safety Manual. Users of this method do so at their own risk.

REFERENCES:

ASTM Designations: B 117, D 523, D 1400, D 3029, E 1164, E 1347 and G 26
California Test 645

End of Test (California Test 671 contains 4 pages)